18.034, Honors Differential Equations
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Recitation Suggestion
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I gave the students a criterion for "structural stability" of a linear system: The system is structurally stable iff

(1) every eigenvalue has mult. 1,
(2) every eigenvalue has nonzero real part.

I did this with the caveat that this is actually meaningless, it only makes sense to talk about a property of a system being structurally stable. Nonetheless, it led to questions which, honestly, I am not able to answer: e.g. is the property of a saddle that there exists 4 orbits whose $\lim t \to \infty$ or $\lim t \to -\infty$ equals 0 a structurally stable property? Anything you want to add will be much appreciated. Next time I will probably define the winding number of a vector field about a circle and the index of a nondegenerate equilibrium point.

I wanted to sketch the orbital portrait for a damped pendulum:

$$\begin{cases} \theta' = \Phi \\ \Phi' = -\omega_0^2 \sin(\theta) - 2b\Phi \end{cases}, \qquad \omega_0^2 > b^2$$

Unfortunately, I didn't have time. If you want to do this, it would be great.